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# A SURVEY ON AD-HOC IN WIRELESS SENSOR NETWORKS

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***Abstract* - This paper says the performance of wireless ad hoc network. A wireless network has several types in it. For more expedient usage in the wireless trait ad hoc network is introduced. Ad-hoc network is a collection of mobile wireless nodes forming a network without any centralized administration. Ad-hoc network consist of self organizing feature with low bandwidth. An ad hoc network doesn't rely on preexisting feature. Minimal configuration and speedy deployment make ad hoc networks suitable for emergency situations like natural disasters or military conflicts. The dynamic and adaptive characteristic made the routing protocols enables ad-hoc networks to be formed quickly. This paper also presents an overview of issues related to Medium Access Control (MAC), and transport in wireless ad hoc networks routing techniques proposed to improve the performance of protocols.**

***Key Terms*: Wireless network, Ad-Hoc network, Wireless Mesh Networks, Wireless Sensor Networks.**

## I. INTRODUCTION

Wireless networks are getting more popular because of its effortlessness. Sensory data comes from multiple sensors of different modalities in distributed locations. Wireless networks are being more and more used in the communication among devices of the most varied types and sizes. The wireless Ad hoc network consists of two operating modes: Infrastructure mode, Ad hoc mode. Infrastructure mode is used to connect computers with wireless network adapters. Ad hoc mode is used to connect wireless clients directly together, without the need for a wireless router or access point. Wireless networks can be arranged even in desert places, in congested areas easily. Quite a lot of protocols can be anticipated to work with even difficult challenges of ad hoc network. Minimal configuration and speedy deployment make Ad hoc networks suitable for emergency situations like natural disasters or military conflicts. In an ad hoc network forwarding the packets mobile communication is used.. Wireless Ad hoc networks can be classified by their application: Wireless Mesh Networks (WMN), Mobile Ad-Hoc Networks (MANET), and Wireless Sensor Networks (WSN). The importance of sensor networks is highlighted by their multiple usages. Wireless networks are used according to the
on-demand basis.

## II. TYPES OF WIRELESS NETWORKS

### A. WIRELESS MESH NETWORKS

A WMN is dynamically self-organized and Self-configured. The gateway/bridge functionalities in mesh routers enable the integration of WMNs with various existing wireless networks.

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### B. MANET

The term MANET referred as (Mobile Ad hoc Network). MANET are connected by wireless links, it is a self-configuring router. The routers can change their location and organize itself randomly. The main issue in
MANET is dynamically changing topology in network. Proactive protocols are also used for convenient usage.

### C. WIRELES SENSOR NETWORKS

In most wireless Ad hoc networks, the nodes compete for way in to shared wireless medium, often resulting interference. Using cooperative wireless communications improves immunity to interference by having the destination node combine self-interference and other- node interference to improve decoding of the desired signal. Multiple nodes and links are used for an ad-hoc network. Links can be connected or disconnected at any time; a functioning network must be able to cope with this dynamic restructuring, preferably in a way that is timely, efficient, reliable, robust and scalable. Wireless networking has witnessed an explosion of interest from consumers in recent years for its applications in mobile and personal communications. Since the network interface is a significant consumer of power, considerable research has been devoted to low-power design of the entire network protocol stack of wireless networks in an effort to enhance energy efficiency. In Ad hoc networks, each node may communicate directly to each other. Nodes that are not directly connected communicate by forwarding their traffic through intermediate nodes.

### C. MEDIUM ACCESS CONTROL (MAC) PROTOCOLS

The important issue for an Ad hoc network is the design of a suitable Medium Access Control (MAC) protocol. The low energy consumption, scalability, requirements such as quality of service (Qos), are efficiently provided by the MAC protocol. Contention-free and contention based are the classifications of protocols for wireless networks [1].Without contending the medium, the contention free schemes pre-define assignments to allow stations to transmit. In general the contention-free mechanisms are employed to provide bounded end to-end delay and minimum bandwidth, privileging delay sensitive applications. MAC mechanism is used in Bluetooth personal area networks to employ a master-slave. On the other hand, contention-based schemes are more suitable for periodic data transfer on mobile networks due to the arbitrary and impermanent nature of the topologies. Wi-Fi local area networks in their Ad hoc mode employ contention-based MAC protocols. For medium access, ALOHA and Slotted-ALOHA are the two contention-based schemes. When ALOHA has its frame to send station accesses the medium as soon as possible. Collision will occur if two or more data sent to a station at the same. But in Slotted-ALOHA access scheme to decrease the collision probability, before beginning to start transmission the station must waits for the pre-defined interval of time. Slotted-ALOHA doubled the efficiency of ALOHA; however, it introduced the necessity of synchronization. To minimize the number of collision another access scheme called CSMA was introduced, which carries sensing before transmitting the data to be sent. The CSMA senses the medium when sending the current data. If the medium is busy, the carrier is sensed, and the station postpones its medium access to avoid collision. The medium transmits the data frame only if the medium is idle. After sensing the medium, depending on the scheme deployed to attempt a transmission after sensing the medium busy CSMA can act as non-persistent or *p*-persistent. When the medium
gets idle, the *p*-persistent CSMA the station transmits with a probability *p* and a random period of time was set to another medium access which is non-persistent. The most famous access scheme for wired networks is a variation of CSMA persistent that detects collisions. This scheme is employed by Ethernet and is called Carrier Sense Multiple Access with Collision Detection. Here, the collision is not possible if there is a free space. This occurrence is referred as Hidden Terminal Problem. To represent the own transmission range each station is centered with dotted circle. Bluetooth and IEEE 802.11 are the technologies which are used mainly for implementing in wireless ad hoc networks. The station A is transmitting to B. As station C cannot sense the ongoing transmission, it may also transmit to B, resulting in a collision at B.

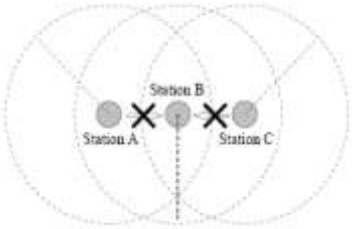


**Fig.1 the Hidden Terminal Problem**

CSMA carries sensing techniques but the MACA(Multiple Access With Collision Avoidance) protocol does not carries sensing instead it knows carrier sense is not possible before transmitting, so that the collision is may be reduced but not completely eliminated. An RTS (Request-To-Send) request is sent containing the length of the transmission. After receiving the RTS, the destination part will send a CTS (Clear-To-Send) packet to the sender. According to the time announced in CTS, the range of destination will defer. The length of the data frame is also mentioned. When the data is long or

have some errors the sending and receiving range of those data will defer, postponed. The station performs the collision action even after sending the RTS transmission, the CTS is not received. A binary exponential bakeoff is performed by the station to resolve collision. MACAW (MACA for Wireless LANs), which adds the acknowledge (ACK) for data frames, it accelerates the loss frame recovery, initiated only in transport level. In Figure 2, station C does not transmit to D even if its transmission will not interfere at destination A. All station does not send frames within the range of communicating node. So, the transmission uses FAMA (Floor Acquisition Multiple Access) protocol sensing used with CTS mechanism.

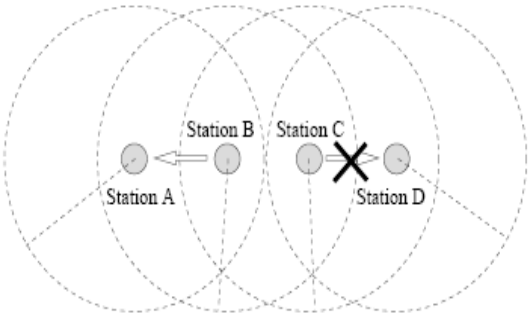


**Fig.2 the Exposed Terminal Problem**

In Figure 1, depending on the propagation delays, a CTS from B to A may have already been received at A, but not at C. When A starts sending its data frame, C has not yet received the CTS, it will simultaneously send a RTS to B. FAMA is able to solve these problems by sending the intervals called inter-frame spaces which increases the propagation and process the delay of network within the station. There is enough time to for transmission within this amount of time gap. The CSMA/CA (CSMA with Collision Avoidance) combines characteristics of CSMA, MACA/MACAW, and FAMA. CSMA/CA senses the medium before transmissions, deploys RTS/CTS, acknowledges data frames, and uses inter-frame spaces to compensate propagation delays. In that Single Channel Protocol setup reservation for transmissions and subsequently transmit their data. Multiple Channel Protocol uses more than one channel to coordinate session among transmitter and receiver are also referred for more convenience.

## IV. BLUETOOTH

Bluetooth is a wireless technology that is being used to deploy personal area networks and adopted as IEEE 802.15.1 standard. Most Bluetooth products are compliant with specification. The Bluetooth architecture consists of a basic unit called piconet and of scatternets. A piconet is an ad hoc network formed by a master and slaves devices. The device can be a master or a slave, but not both at the same time. The master is the device that establishes the piconet and the slaves are the other devices that belong to the piconet. The master informs the slaves the logical addresses to be used, when the slaves can transmit and for how long and what Frequencies must be used in transmission. Communication is always between a master and one or more slaves (point-to-point or point-to-multipoint). There is no direct communication between slaves. A piconet is composed of a master and up to seven active slaves. Moreover, there may be up to 255 inactive devices in the network, in a low-power state. The maximum number of active devices could limit the applicability of Bluetooth, but a Bluetooth network can be extended by the interconnection of piconets. In this case, the network is called a scatternet and the piconets are interconnected by bridge nodes. The bridge between the piconets can have the role of slave in all piconets to which they belong or of master in one piconet and slave on the others. A bridge cannot be master in more than one piconet, because the master is the unit that establishes the frequencies to be used in communication. Bluetooth uses a Time Division Duplexing (TDD) scheme, with a 625 $\mu$s slot time. The master begins its transmission in even slots and slaves transmit in odd slots. Frames can be one, three or five slots long, depending on the frame type. M Frames are transmitted over links called logical channels between the master and one or more slaves. There are two kinds of links: ACL (Asynchronous Connectionless) and SCO (Synchronous Connection-Oriented). The ACL is a point-to-multipoint link between the master and all active slaves of the piconet. There is only one ACL link per piconet.

## V. SIMULATION OF WIRELESS AD-HOC NETWORKS

One key problem to Wireless Ad Hoc networks is foreseeing the variety of possible situations that can occur. As a result, Modeling and Simulation using extensive parameter sweeping and what-if analysis becomes an extremely important paradigm for use in ad hoc networks. Traditional M&S tools include NS2,(and recently NS3), OPNET Modeler, and Net Sim. However, these tools focus primarily on the simulation of the entire protocol stack of the system. Although that can be important in the proof-of-concept implementations of systems, the need for a more advanced simulation

methodology is always there. Agent-based modeling and simulation offers such a paradigm. Not to be confused with multi-agent systems and intelligent agents, agent-based modeling originated from social sciences, where the goal was to evaluate and view large-scale systems with numerous interacting "AGENT" or components in a wide variety of random situations to observe global phenomena. Unlike traditional AI systems with intelligent agents, agent-based modeling is similar to the real world. Agent-based models are thus effective in modeling bio-inspired and nature-inspired systems. In these systems, the basic interactions of the components the system, also called Complex Adaptive System, are simple but result in advanced global phenomena such as emergence.

## VI. CONCLUSION AND FUTURE SCOPE

This Chapter has discussed WSN issues and example solutions for the MAC layer, routing, localization. These solutions are deferent from past networking solutions was stressed. The future work of wireless networks become an integral component of the modern communication infrastructure, energy efficiency will be an important design consideration due to the limited battery life of mobile terminals.

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